looking ahead

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In This Issue—

1970 WITHOUT ARMS CONTROL

THE NEED for an ANTI-RECESSION PROGRAM
By H. Christian Sonne

MILITARY RESEARCH and DEVELOPMENT
By Herbert E. Striner

the people of NPA

Tomorrow's Possible Weapons

1970 Without Arms Control

A Report of the NPA Special Project Committee on Security Through Arms Control

"Motivated by the belief that scientific application of skills recruited from many diverse backgrounds of learning and experience might help to provide answers to the vital questions raised by the accelerating race of contemporary arms, the National Planning Association last year created a Special Project Committee on Security Through Arms Control. . . . For its first report, the Committee has . . . described weapons as they exist today and as they may be expected to develop during the next dozen years, assuming the arms race continues."—From the "Foreword" by H. Christian Sonne, NPA Chairman. Below is a partial text of the report.

THE EMPHASIS on a point of time a dozen years off is necessary, unfortunately, because negotiations for arms control proceed slowly, while weapons development accelerates. If serious plans are to be promulgated for the future, they must take account of tomorrow's conditions or they will be obsolete before they are announced. But since the weapons of a dozen years hence, in large measure, will be an extension of the matériel which is in operation and on the drawing board today, a close examination of the military tools and doctrines of 1958 is necessary. The lead time from the conception of a new weapon to its actual use often has been longer than a dozen years. Although efforts are being made drastically to shorten this lag, it is safe to assume that weapons now being developed and tested will remain in the military force structure, along with newer weapons, through 1970.

Security: Implications and Imperatives

Using public information and assuming continued East-West political conflict without arms controls, we have made some estimates about the nature and significance of weapons trends during the next dozen years.

Combating Communism

- ". . . the American task is doubly difficult: the United States must work toward the construction of a new and better world order and at the same time it must be alert and vigorous in anticipating and counteracting Soviet moves.
- "If American strategy is overwhelmingly concerned with countering the Soviet threat, and if American tactics consist solely or mainly of reacting to Russian moves and methods, then the United States is impeded by a self-imposed handicap which could well prove fatal in the end. . . . It must equally have positive and constructive goals which express the aspirations for peace, freedom and increased welfare of men and women everywhere. In combating communism, it is above all necessary to convince people that there are worthwhile and attainable alternatives to it."

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From the NPA International Committee Statement on A Positive Foreign Policy for the United States, *Special Report No. 49, May 19, 1958.*

Photographs of the Annual Meeting appearing in the April issue of Looking Ahead, on pages 1, 6, 7, and 8 are by Chase Studios, Washington, D.C.

Highlights of Weapons Design Trends

From the points of view of both national security and an approach to a rational world security system, several significant aspects of the design trends in weapons systems have special significance. One is the fact that smaller nuclear explosions represent a more likely trend than larger explosions. Huge explosions, of course, are technically feasible, but their utility is questionable. But more significant than the amount of explosive force will be the continued trend to smaller sized weapons. Nuclear weapons will be small enough for fighter aircraft, missiles, artillery pieces, and even "suitcase" A-bombs.

The extent of radioactive effects from nuclear explosions depends on both the type of bomb construction and the circumstances of the explosion. Assuming bombs were to be exploded for minimum effects, developments can be expected to reduce the extent of radioactive effects per unit of explosive power and per pound of bomb. But there has been no public evidence that practical bombs with no radioactive effects can be achieved during the next dozen years.

The world is beginning to test ballistic rocket weapons whose speed approaches the velocity needed to escape from the earth. There will be two significant trends in delivery systems:

- Bases will become more mobile, more dispersed, much smaller, less detectable, and less vulnerable.
- The reaction time of delivery systems will shorten.

The implications of rapidly decreasing reaction times are ominous. There will be less and less time for investigation and making decisions. Weapons control will become both concentrated and delegated. Modern communications will concentrate control of ready-to-fire rockets in one or a few command posts. If reaction time is to be instantaneous, command must be delegated. Neither Congress, nor the President, nor other high officials can be expected to man these control posts continously. Concentrated, delegated control of instantaneous massive weapons will bring dangers of ill-considered, irresponsible, and even fanatical actions. While the probability of such action may be very small at any one instant of time, over the years the cumulative risks would be formidable.

Accuracy of weapons, both for defense and counteroffense, will, of course, increase steadily but not fast enough to offset the two dominant characteristics of opposing delivery systems—speed of delivery and the increasing invulnerability of bases. Thus, defense, either by counterattack or by Maginot-Line techniques, does not look promising. Retaliatory doctrines will dominate the great-power scene. Expressed less technically, threatened mass destruction would not be thwarted effectively by an opposing defense force, but would be answered, after the fact, by retaliatory mass destruction.

The arms race is also producing the so-called Nth country problem. In the absence of arms controls, modern weapons will, through gift, loan, sale, or local development, come into possession of more and more nations. Super-weapons in the hands of irresponsible or even fanatical men could introduce further instability into the world's security arrangements.

Another significant trend in design of weapons is that they will become harder to inspect. The certainty of physical means for detecting nuclear warheads is already so low that both the United States and Soviet Union have abandoned for the present any proposals directly to control nuclear stockpiles. While airfields are now easily detectable, dispersion, mobility, and concealment of missile bases will make delivery systems as difficult to discover as nuclear stockpiles are today.

One other trend may appear. With the great powers in a military stand-off, where violent conflict poses losses for each which would more than offset any possible gains, science will probably be asked to develop tools of a more subtle type. Psycho-physiological instrumentalities and bacteriological conflict could appear in forms entirely disassociated from violent conflict. And the possibilities for weather modification, now only faintly understood, could lead to techniques for climatological conflict.

Thus, arms controls feasible today will become very uncertain tomorrow. The world is fast becoming locked into a situation from which it will become increasingly difficult to extricate itself.

Costs of the Arms Race

In the United States, at present levels, about 10 percent of the gross national product is now devoted to military purposes. It is estimated that 15 percent of the gross national product of the Soviet Union is similarly devoted. The rapid but unpredictable course of technological development promises to push such expenditures even higher.

While arms expenditures in the United States have not produced real hardships to the consuming public, such expenditures are straining several European economies. Even more serious is the effect of arms expenditures upon the less developed countries. The industrialized nations could provide substantial development assistance if they were free of these arms burdens. More significant than the financial costs of the arms

race, however, is the tremendous drain which it makes upon scientific and technological resources. Over 50 percent of the research and development effort of the United States is expended for military purposes, and a larger percentage probably is spent in the Soviet Union. Meanwhile, a backlog of peaceful scientific tasks awaits attention.

But far more important than the material costs are the human costs. Retaliatory plans emphasize the destruction of population centers. They thus promote a spirit of indifference to the widespread subjection of civilians to the horrors of warfare. In the seemingly logical pursuit of an idea we may thus lose sight of the prime goal of a war plan—namely, the best defense of our national values, ethics, and institutions. The creation of enormous industries directed toward a capability to destroy millions of innocent noncombatants involves an inevitable denigration of the humanities, regardless of the determination to reserve this power as a method of preserving peace.

On the credit side, it is frequently said that the arms race is producing weapons so horrible that no nation would use them because of its fear of retaliation. Indeed, this inhibiting factor has already operated to prevent nuclear warfare in several crises. But fear of retaliation may not operate in a period when the arms race is momentarily unbalanced in favor of the potential aggressor, or when the potential aggressor, rightly or wrongly, so estimates the situation. Progress even on the defensive side, for example, could upset the balance and might prompt acts of diplomatic boldness. A mistake could always occur in estimating a situation.

Increasing Difficulties of Control

The devastation that followed World War II led to a search for a method of securing lasting peace which is still continuing. The necessity for arms control is recognized in principle at the meeting place of the governments of the world, and all national leaders pay their respects to the necessity for what is broadly termed "disarmament." Almost since its inception, the United Nations has sponsored disarmament negotiations, as did its predecessor, the League of Nations. In recent years, disarmament negotiations have been pursued diligently in a subcommittee of the Disarmament Commission. The protracted duration of these negotiations and the fact that the Soviet Union has announced an unwillingness to participate further in the UN sessions are frequently regarded as an indication of failure. But the fact that the nations have continued to seek solutions in many ways can be regarded as a sign of hopefulness. It would hardly be expected that arms-control agreements could be achieved easily.

A disarmament agreement can be worse than useless unless it provides for safeguards against violations, and unless it effectively assures national security. Its purpose is to diminish, not increase, risks. However, it would be grossly unrealistic for any nation to assume that no risks inhere in the present situation. There are too many risks in the present situation to rely on a leisurely pursuit for perfection in the vaguely distant future. Indeed, each year's delay sees further developments of military technology which, in turn, make a fair and workable agreement harder to reach.

The technological strides we have reviewed have brought into question the effectiveness of earlier disarmament plans. For example, before the build-up of atomic stockpiles, effective control might have been achieved through mere control of raw materials, as proposed in the Baruch Plan. With the acquisition of stockpiles, which easily can be concealed, the opportunity for a reliable check on fissionable materials disappeared, and it became necessary to address an inspection program toward delivery systems—a much larger problem even during a time of large airports and manned aircraft. Yet, this problem will become even more difficult with missile bases. Underground, undersea, and mobile launching sites are still harder to detect. The development of underwater submarine-based missile systems will vastly expand the areas to be searched, and space-based weapons will present fantastic problems.

Science for Arms Control

The ever-accelerating progress in weaponry is the result of the intensive application of the skills of the ablest and best scientists and the expenditure of almost unlimited funds. Plans for arms control, which are addressed to these developments, usually involve the labors of a relatively few experts, often borrowed from other governmental tasks. They depend for scientific advice upon the armed forces, who sometimes speak with the bias of their own branch of service as against other branches, and who have an understandable reluctance to underwrite nonmilitary security plans. Yet, just as each new weapon of attack necessitates the mobilization of tremendous effort for the development of its defensive counterpart, so also does each new weapons system pose completely new research problems for the creation of an enforceable and trustworthy system of arms control.

If disarmament plans are to keep abreast of the inventiveness of our weapons designers, there

must be a far more serious application of scientific and planning skills to the problems of arms control. Within governments, such skills are indispensable to the production of plans which are both thoroughgoing and sufficiently sound in terms of national security so that a government can stand solidly and consistently behind them. The scientific staff performing such planning must necessarily have primary responsibility to the agency of government which is coordinating and supplying the forward momentum to disarmament efforts. Other agencies cannot be depended upon for final scientific judgment in technical matters.

On the international level, too, technical advice, independent of political concerns, might well be provided by a United Nations scientific advisory committee composed of scientists of international reputation, selected by the Secretary-General from a broad cross section of disciplines and geographical areas. While such a committee would not have access to classified data of member nations, it could provide authoritative technical answers to some of the knotty problems related to inspection and control. It could also use techniques of operations analysis and war gaming, keeping the public fully informed, to test whether the measures proposed would increase the security of all parties. Accurate and impartial answers provided by scientists bearing an international responsibility would not in themselves provide an arms-control agreement, but they would help to clarify the problem and to remove many questions of scientific feasibility from the arena of political controversy. This might help to make political issues easier of solution.

Since, of necessity, disarmament agreements cut across the concerns of many branches of government, an arms-control convention can be achieved only if the very highest officials of the leading nations give continuous attention to the process of negotiations. They must stand ready to take thoroughly informed and decisive action on matters which cut across the compartmentalized interest of specific departments. This is not to imply that heads of government must necessarily meet with each other to arrive at these decisions. By their very nature, arms-control plans premise basic changes in security concepts and thus they cannot be handled as part of the daily routine of foreign office business.

Essential, also, is an informed public which is capable both of constructive criticism of national policies and of generation of fresh ideas and new approaches. Nongovernmental thinking has been of very great importance in many of the notable achievements of government during the past century.

Members of the Committee

Chairman of the NPA Committee on Security Through Arms Control is Richard S. Leghorn, President of the Itek Corporation, Boston, Massachusetts. Leghorn, a reserve Air Force Colonel, is a consultant to the U.S.A.F. Scientific Advisory Board, a former consultant to the White House Disarmament Staff, a member of the NACA Committee on Space Surveillance, and author of various articles on defense and disarmament. Jerome H. Spingarn, a Washington, D. C. lawyer, and writer on disarmament problems, served as Staff Director of the Committee.

Other members of the Committee are: Archibald Alexander, former Assistant Secretary of the Army; Harrison Brown, Professor of Geochemistry, California Institute of Technology; David F. Cavers, Associate Dean, Harvard Law School; Norman Cousins, Editor, *Saturday Review;* William Davidon, Physics Department, Argonne National Laboratory; Harvey A. De Weerd, military historian, Rand Corporation, Santa Monica; David H. Frisch, Professor of Physics, Massachusetts Institute of Technology; David R. Inglis, Argonne National Laboratory; Amrom H. Katz, aerial reconnaissance expert, Rand Corporation, Santa Monica; Edward L. Katzenbach, Jr., Director, Harvard University Defense Studies Program; Klaus Knorr, Center of International Studies, Princeton; Mrs. Albert D. Lasker, President, Albert and Mary Lasker Foundation; Walter J. Levison, Assistant Director, Boston University Physical Research Laboratories; John F. Loosbrock, Editor and Assistant Publisher, *Air Force Magazine;* T. G. MacGowan, Director of Advanced Planning, Firestone Tire and Rubber Company; David Riesman, Department of Sociology, University of Chicago; Lauren K. Soth, Editor, Editorial Pages, *Des Moines Register & Tribune;* Albert M. Stone, Applied Physics Laboratory, The Johns Hopkins University; Robert C. Tait, President, Stromberg-Carlson Co., Division of General Dynamics; Wayne Chatfield Taylor, Chairman, Executive Committee, National Planning Association, former Under Secretary of Commerce; Robert C. Tucker, expert on Russian affairs, Rand Corporation, Washington, D.C. David Winton, Chairman of the Board, Winton Lumber Company; Arnold S. Zander, President, American Federation of State, County & Municipal Employees AFL-CIO.

(*1970 Without Arms Control,* NPA Special Project Committee on Security Through Arms Control, Planning Pamphlet 104, National Planning Association, Washington, D.C.: May 1958, 72 pp., $1.25.)

Alberto Lleras Camargo Elected President of Colombia

Liberal Party leader Alberto Lleras Camargo, President of Colombia from 1945 to 1946, was again elected to the Presidency in the May 4 elections.

Sr. Lleras is a member of the NPA Interamerican Research Committee, which has been established to "find a new approach for cooperation among the peoples of the Western Hemisphere. . . . It will undertake research, publish the results of research, and recommend—for public education and stimulation of public and private action—policies and programs based on research."

". . . it is more prudent to err on the side of acting too boldly than too timidly."

The Need for an Anti-Recession Program

By H. Christian Sonne

A partial text of the opening remarks of a statement by the NPA Chairman presented at the request of the House Committee on Banking and Currency, May 2, 1958.

CURRENT STATISTICS, on a seasonally adjusted basis, indicate that economic activities continued to contract in March and April. Total production is now running at an annual rate of probably $30 billion below a satisfactorily high level of activity. With respect to the economic outlook the picture is neither entirely black nor entirely white. On the black side are the recent surveys which indicate that business investments in plant and equipment are likely to continue to decline into 1959. On the positive side is the expectation that Federal government expenditures are bound to rise although the increase under legislation already adopted will be of limited size only. In addition, state-local expenditures are still going up. There is also the prospect that residential construction will rise—in part as a result of the housing legislation passed by Congress, in part as a result of the reduction in long term interest rates.

Due to the increase in transfer payments, the decline in personal incomes and consumer spending (except for durable goods) has not been as severe as the decline in industrial production. The great unknown is the inventory outlook. The rate of decline, however, appears likely to slow down. When it will stop and possibly give way to a rise in inventories is uncertain.

I would conclude from these various indicators that with the expected increases in government spending the downward movement will probably come to an early halt. It is much less certain however, that sustained recovery will occur in the near future unless further anti-recession measures are adopted. I am most doubtful that in the near future we will be back on the road towards a satisfactory level of activities if we wait for the forces of the market to resume their expansion. We should always remember that if we should continue at the current level of economic activities for the rest of the year, we would by the end of the year be running at a rate closer to $40 billion below a satisfactory level of employment and production.

It is with this economic outlook in mind that I look at the anti-recession measures which have been adopted until now. I recognize the intensive work done by your committee, particularly in preparing the recent housing legislation. Nevertheless, more needs to be done, mainly in three different fields of government measures:

1. A further liberalization of monetary and credit policy which will provide sufficient funds for business when expanding markets require additional use of business credit.
2. A further increase in needed defense and nondefense expenditure programs in which we have deficiencies and which merit expansion irrespective of the recession.
3. A consideration of tax reduction measures recognizing that the increase in expenditures will probably require considerable time and that some prompt support of slackening purchasing power is needed.

I RECOGNIZE that there is not much time left for additional legislation in this session of Congress and that considerable time is needed for implementing government expenditure programs. Therefore, I believe that not much more than an increase of about $4 billion in expenditures could be expected for the fiscal year 1959 from legislation already adopted or under deliberation. This increase in government spending plus a tax reduction of about $7 to $8 billion would provide the economy with the stimulus which I believe would put us back on the track of expansion. This would make business expansion attractive again, would lift incomes, profits, and tax yields and thereby would over a period of two to three years reduce the budget deficit which otherwise would occur. An increase in expenditures by about $4 billion coupled with a reduction in taxes by $7 to $8 billion seems to be large. However, it is not too large if seen in the perspective of the task, namely raising production by $30 to $40 billion.

I am aware that serious objections may be raised against such a program. Some say that it is premature because a recovery may come about in response to measures already taken. That is a possibility. However, further action during

this session of Congress cannot long be delayed. Since we have to make decisions under conditions of uncertainty, we should ask ourselves whether greater harm could result from action which is too big or from action which may turn out to be inadequate. I believe that the recession has already caused considerable harm not only in terms of human frustration, but also in undermining business confidence, in irretrievable losses of production, in terms of its repercussions particularly on raw material producing foreign countries, and in damaging our international position in general.

Ever since the adoption of the Employment Act of 1946 we have told ourselves and the world that we now have the determination, the machinery, and the know-how to act in case of a serious economic downswing. I fear there has been too much hesitation in carrying out the anticyclical policies which were practically agreed should be used when the occasion arose. This hesitation may be in part explained by the fear of adding to a budget deficit which will be large anyway as a result of the recession. However, while we are hesitating, the problem is growing in magnitude, the expected recession deficit is becoming larger, and confidence is being shaken. In this situation I think it is more prudent to err on the side of acting too boldly than too timidly.

IT MAY TURN OUT that one or two years from now government demand plus business demand plus investment demand plus consumer demand will have risen so much that they strain our capacity to produce. Remembering that we have in the aggregate $30 to $40 billion to go, it is not very probable that this will happen so soon. Nevertheless, if it should happen, particularly if the international situation should force us to step up defense programs substantially, we will have to mobilize our productive reserves—not only by bringing the unemployed back to work, but also by working longer hours and giving some of the older and handicapped people a chance to continue to work if they desire. When rising demand for goods reaches the limits even of our elastic capacity ceiling, restrictive tax, fiscal and credit policies could be resumed. True, we have not yet mastered the problems of inflation, particularly of the cost-push variety. It would, however, be defeatist if because of our fear that we will be unable to master the problems of a possible future price rise, we decide to run the risk of prolonging mass unemployment and leaving productive capacity unutilized. Taking this risk is unjustified in any event; in a period of coexistence with a hostile rival system of economic, social and political organization it would be unforgivable.

—The People of NPA—

Leland Hazard

Leland Hazard, Vice President and General Counsel, and Director of Pittsburgh Plate Glass Company, and member of NPA's Business and Finance Committees, is well known in the field of educational television—championing such programming as Chairman of Metropolitan Pittsburgh Educational Television Station WQED, which is financed by voluntary public contributions and which broadcasts to Pittsburgh, Allegheny and adjoining counties. He is also a Director of the Educational Television & Radio Center, Ann Arbor.

Mr. Hazard was educated at William Jewell College, the University of Missouri, and Harvard Law School. During World War I he served with the A. E. F. in France and Germany, and was promoted from the rank of Second Lieutenant to Major. Following the War he was admitted to the Missouri Bar and practiced in Kansas City from 1920 to 1938, when he became Counsel for Pittsburgh Plate Glass Company. He was admitted to the Pennsylvania Bar in 1940.

In 1947 he was appointed to his present position with Pittsburgh Plate Glass Company.

Mr. Hazard was President of the Community Chest of Pittsburgh and Allegheny County in 1949 and 1950. He contributed a chapter entitled "Community Chests" to the 1952 NPA book, *The Manual of Corporate Giving*. He is a frequent contributor to various publications including the *Atlantic Monthly* and the *Harvard Business Review*. He is currently a member of the Executive Committee of the Allegheny Conference on Community Development, and Director of the Pittsburgh Symphony Society. His professional affiliations include: the American, Pennsylvania, Missouri, and Allegheny County Bar Associations.

A Spur to Economic Progress

Military Research and Development

By Herbert E. Striner

Economist, Operations Research Office
The Johns Hopkins University

This article represents the views of the author which are not necessarily those of the Operations Research Office.

MILITARY RESEARCH and development differs from privately conducted research only in that it emphasizes new knowledge, products, and techniques which can be applied to military problems.

What we term "the military" is in fact a vast complex of activities many of which have civilian counterparts, although the objectives of these parallel activities may be different. As a result of widespread unawareness of this close relationship, there has been relatively little appreciation of the degree to which the findings of military research and development are applied to civilian uses and, indeed, the degree to which military research affects resource and economic development in the country as a whole.

Each of these impacts has attained varying degrees of importance in various countries during most of recent history. In the United States, both the civilian applications and the over-all economic impacts have been present since the beginning of the 19th century. Only recently, however, has military research begun to play a major part in resource and economic development.

The transferrence value of products or techniques stemming from military research, or financed by military research funds, began to be recognized in this country early in our national history. In 1798 Eli Whitney accepted a military contract with the U. S. government to develop a system of manufacturing interchangeable parts for arsenal production of firearms. By making mass production possible, his contribution was fundamental to the continuing progress of the industrial revolution throughout many parts of the world. Though interchangeable parts would doubtless have been invented sooner or later, their development and civilian use came sooner because of a military need.

Some of the contributions made through the years by military-conducted or -stimulated research and development to civilian life are well-known. These include: yellow fever eradication, chlorination of water, nuclear power, blood plasma substitutes, the modern aircraft, new high-temperature alloys, and the modern automobile automatic transmission.

Other products and techniques not so well-known, though nonetheless valuable, include: nitrogen mustard treatment of leukemia and other cancers, many of the better insecticides and rodenticides, mechanical smoke generators for crop protection, flame-proof fabrics, heat-resistant and fire-retardant paints, aircraft engines, helicopters, anti-icing equipment, new plastics and adhesives, new automobile power steering and suspension systems, advanced weather prediction techniques, tissue-bank techniques, miniature electronic components, automation, silicon transistors, and automatic electronic computers.

These contributions—only a small percentage of the total—and many, many others have led to better use of our resources base. This, indeed, is the major objective of research—to achieve maximum benefits from our factors of production.

Moreover, with the major gains which science has recently made, partly as a result of military research and development, we begin to see something else happening—the *creation* of resources. Until now, man has in effect worked with resources as they were. But in experimenting with some substances, such as chemicals, we have been able to rearrange the basic structures of materials to some degree.

WITH THE ADVENT of our "new" physics, the core of matter itself—the atom—has become the basic resource being manipulated. Materials which formerly have been viewed as marginal resources are now coming to be seen as important resource "building blocks." For example, sea water may become a cheap source of energy for industry. Ahead of the present concept of "in-place" resources, or resources in a gross form, we now begin to see a horizon of resources created from the basic building blocks of matter, tailored to suit the ever-changing needs of man.

Since over 50 percent of all research and development in the United States is being done by or

for our military agencies, the effects on and the importance to the entire economy of military research and development cannot be underestimated. Growth of the productivity and output of the economy are fostered by research and development, and any change in its volume and quality will have important effects upon the direction and rate of the economic development of the nation.

In the light of our economic competition with the Soviet Union, it would appear that the entire research and development base from which our industrial potential springs, and which is necessary to produce a constantly expanding economy and society, is of major importance. It is clear that research and development, done by or for the government, is now an integral part of the economy—necessary to the security and economic well-being of the nation.

Beyond the near future, it is not clear which particular agencies of the government will be involved in the necessarily high levels of research and development. In the foreseeable future, there is no question but that the military will continue to be the chief instrument of government research and development, due to the widening technological base of our weapons system.

THE MAJOR PROBLEMS which confront us now with respect to research and development are the determination of whether we are devoting enough effort to research and development in the United States, and how to insure that research and development in the United States is supported at a sufficiently high or adequate level. In these two decision areas, the forces of government and private enterprise (including both management and labor) are vitally concerned. Both governmental and private organizations must be brought together in this area. Both have a vital impact on this country's total research and development as well as on each other's research and development programs. With research and development as one of the major supports of national security and economic development, a better understanding of the impacts of each of these sectors on the other, as well as an approximate idea of necessary levels of research and development which should be maintained in the United States are imperative.

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